

CHAPTER 6  
DESIGN DOCUMENTATION

6-1. Introduction.

a. Design and construction documentation must comply with [ER 1110-345-700](#), Design Analyses, Drawings, and Specifications. Complete design packages must include a thorough and complete design analysis that documents all design issues, assumptions, critical parameters and special site-specific considerations. Additional information may also be required by state and/or federal agencies for design submittals.

b. The design analysis must include a complete narrative description as well as supporting calculations including the material balances and modeling assumptions and results. This information is required to be submitted as part of the design package; however, it is not required to be included as part of the construction bid package issued to contractors.

c. This chapter will discuss typical drawings and specification sections normally included in a MPE design package; however, site specific requirements will vary and actual needs may differ from those shown below.

6-2. Drawings. Typical drawings required for MPE design may include some or all of the following:

- Site location.
- Legend and general notes.
- Site plan and profiles.
- Well construction and surface cover details.
- Exterior details.
- Piping and equipment layout.
- P&ID with control logic identified.
- Piping sections.
- Piping plans.
- Piping profiles.
- Piping details.

- Pitless adapter details.
- Pump setting details.
- Interior details.
- Foundation plan & structural details (where required).
- Power plan.
- Power/control plan including control panel layout and sequence of control.
- Electrical details/wiring diagram including legend and standard symbols.
- Lighting, power and one-line electrical diagrams.
- Schedule of valves (valve ID #, size, type, material of construction).

6-3. Specifications. Typical specification sections that may be utilized in MPE designs are listed below. Where applicable, the CECS section number is presented. Specifications shown ending in XXX are either currently under development by USACE or may need to be developed by the designer to meet project specific needs. The designer should always check [TECHINFO](#) for the most recent versions of all guide specifications and the addition of new ones. TECHINFO can be reached through the Home Page of the U.S. Army Engineering Support Center, Huntsville.

a. Typical Specification Sections

(1) Work Plans.

01240	Cost and Performance Report
01270	Measurement and Payment
01320	Project Schedule
01330	Submittal Procedures
01351	Safety, Health and Emergency Response
01410	Environmental Protection
01450	Chemical Data Quality Control

01451 Contractor Quality Control  
01XXX Special Items  
01XXX System Startup, Operation, and Maintenance Plans

(2) Site Work.

02120 Transportation and Disposal of Hazardous Materials  
02150 Piping; Off-Gas  
02220 Demolition  
02230 Clearing and Grubbing  
02260 Soil-Bentonite Slurry Trench for HTRW Projects  
02300 Earthwork  
02316 Excavation, Trenching, and Backfilling for Utilities Systems  
02500 Pipelines, Liquid Process Piping  
02521 Multi-Phase Extraction Wells  
02522 Ground-water Monitoring Wells  
02699 Valve Manholes and Piping and Equipment in Valve Manholes  
02741 Bituminous Paving for Roads, Streets and Open Storage Areas  
02754 Concrete Pavement for Small Projects  
02975 Sealing of Cracks in Bituminous Pavements

(3) Extraction and Treatment System Specifications.

11211 Pumps: Water, Centrifugal  
11212 Pumps: Water, Vertical Turbine  
11215 Fans/Blowers/Pumps; Off-Gas  
11220 Precipitation/Coagulation/Flocculation Water Treatment

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11225	Downflow Liquid Activated Carbon Adsorption Units
11226	Vapor Phase Activated Carbon Adsorption Units
11242	Chemical Feed Systems
11301	Air Stripping Systems
11377	Advanced Oxidation Processes (AOP)
11378	Thermal (Catalytic) Oxidation Systems
11393	Filtration System
11500	Air Pollution Control
11XXX	Vapor Phase Resin Adsorber
11XXX	Package MPE System
11XXX	Multi-Phase Separator or NAPL-Water Separator
13121	Metal Building Systems (Minor Requirements)
13405	Process Control
15400	Plumbing, General Purpose
16370	Electrical Distribution System, Aerial
16375	Electrical Distribution System, Underground
16415	Electrical Work, Interior
16475	Coordinated Power System Protection